DOCUMENT RESUME

ED 202 594 PS 012 196

AUTHOR Pellegrini, A. D.
TITLE The Development of Preschoolers' Private Speech.
SPONS AGENCY Georgia Univ., Athens. Coll. of Education.
PUB DATE Apr 81
NOTE 27p.; Paper presented at the Annual Meeting of the American Educational Research Association (Los Angeles, CA, April 13-17, 1981).

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Age Differences; Child Language; *Egocentrism; *Language Acquisition; Language Patterns; Peer Relationship; Play; *Preschool Children; Preschool Education; Puzzles; Semantics; *Speech Habits; *Verbal Communication
IDENTIFIERS *Private Speech; Self Regulation

ABSTRACT

The intent of this study was to examine the development of three aspects of preschoolers' private speech: coefficients of egocentricism, the extent to which speech regulates actions, and the syntactic and semantic structures of individual utterances. Forty-one randomly chosen preschoolers (26 females, 15 males) were placed in three age groups (3, 4, or 5 years). Children were videotaped while they did two age-appropriate puzzles. Three-year-olds' coefficients of egocentricism were significantly greater than coefficients for both 4- and 5-year-olds. Regardless of age, children talked while acting. Three-year-olds asked most questions-to-self. All children's utterances were syntactically complex. Semantic structure analyses indicated that regardless of age, children encoded patient case utterances, perceptually present objects, and state verbs. All children tended to use private speech to encode names of puzzle pieces and locations for pieces while they were acting. (Author/MP)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED202594

Sections of this paper were presented at the Annual Meeting of the American Educational Research Association Meeting, April, 1981, Los Angeles, CA.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

The development of preschoolers' private speech

A. D. Pellegrini
University of Georgia
Early Childhood Education
427 Aderhold Hall
Athens, GA 30602
404-542-4244

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
A.D. Pellegrini
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

PS012196

*This research was funded by a grant from the College of Education of UGA. I would like to acknowledge Brenda Floyd's help with data collection and coding; Bill Ripley, of the UGA Educational Research Lab, for his tireless help with data analyses.

Running head: Private speech development

Abstract

The intent of the study was to examine the development of three aspects of preschoolers' private speech: Coefficients of egocentricism; the extent to which it regulated actions; the syntactic and semantic structures of individual utterances. Forty-one randomly chosen preschoolers (26 females, 15 males) were placed in three age groups (3, 4, or 5 years). Children were videotaped while they did two age appropriate puzzles. Three year olds' coefficients were significantly greater than coefficients for both four and five year olds. Children, despite age, talked while acting. Three year olds asked most questions-to-self. All children's utterances were syntacally complex. Semantic structure analyses indicated that children, despite age, encoded patient case utterances, perceptually present objects, and state verbs. All children tended to use private speech to encode names of puzzle pieces and locations for pieces while they were acting.

The debate over the functions of preschoolers' speech-to-self, i.e., private speech, has a long and interesting history. As is well known, Piaget (1962) characterized preschoolers' talking to themselves as being egocentric or insensitive to social contexts. He also characterized private speech as not having a cognitive function; language follows thought, it does not guide thought.

This position has been consistently criticized by Soviet psychologists. Vygotsky (1962, 1976) and Luria (1961) both argued that preschoolers' private speech has a social origin and serves a cognitive function. They posited that private speech originates in social dialogues held between the child and an adult. As the child develops, private speech serves the cognitive function of guiding his/her own behaviors, i.e., self-regulation. In describing the ontogeny of private speech during the preschool period, Vygotsky (1962) also hypothesized about the syntactic and semantic structure of individual utterances in relation to self-regulation. He stated that as the child used private speech to guide his/her behavior, utterances would become syntactically abbreviated. In terms of semantics, only the most relevant aspects of a situation would be encoded into the utterance.

The intent of this study was to examine these Soviet hypotheses relating to preschoolers' private speech. The three general areas examined were: the social ontogeny of private speech; the ontogeny of the self-regulating function of private speech; the syntactic and semantic structure of private speech.

The social origin of private speech was described by Vygotsky (1962) and expanded upon by Luria (1961). It was stated that young children's actions, at approximately 1½-3 years of age, are directed by an external agent's verbal instructions. The agent's verbal directions to the child

helped him/her regulate, i.e., initiate and inhibit, his/her own actions. At approximately 3-4 years of age children, themselves, overtly use these same regulatory dialogue forms to regulate their behavior. Children older than four years of age were characterized as covertly using the dialogue forms to regulate their behavior. Thus, it was hypothesized that the social ontogeny of private speech originates in social dialogue with an adult. With development, children use these dialogue forms themselves, first overtly then covertly, for self-regulating. This is what Vygotsky meant when he said that self-regulating private speech moved from an interpsychological to an intrapsychological plane.

The first objective of this study was to test this social internalization hypothesis that preschoolers generate less observable private speech as they develop. This has traditionally been measured by a coefficient of egocentricism (Piaget, 1962): the ratio of all private speech utterances compared to the total of all social and private speech.

The child's ability to use private speech for self-regulation was also hypothesized to develop during the preschool period. Luria (1961) stated that the child's overt private speech initially does not serve a self-regulating function. Private speech for young children is typically generated <u>after</u> action initiation; speech encodes objects and actions, it does not guide behavior. With development, private speech does regulate the preschoolers' behavior. The initial form of self-regulation is characterized by private speech <u>accompanying</u> actions. The next, and higher, form of self-regulation has private speech <u>preceding</u> action initiation.

Another aspect of self-regulating private speech, in addition to preceding action, is that it is characterized as serving a planning/analytic

function (Wertsch, 1979). Private speech serves this function if the semantic intent of the utterance indicates that the speaker will execute a future action or plan: semantic self-regulation. Semantic self-regulating utterances are typically characterized by a future tense verb or serving a command, a question, or a planning function. These criteria for semantic self-regulation have been outlined by students of private speech (e.g., Fuson, 1979; Rubin, 1979), linguists (e.g., Lyons, 1977; Wertsch, 1979), and speech act theorists (Austin, 1971).

The second objective of this study was to test two hypotheses relating to the ontogeny of self-regulating private speech: one, with age, preschoolers' generate more self-regulating speech, i.e., utterances accompanying and preceeding actions; two, with age, preschoolers' generate more semantically self-regulating speech.

As preschooler's develop the self-regulating function of private speech, Soviet psychologists hypothesized (Vygotsky, 1962; Leont'ev, 1976-77) that the linguistic structure of these utterances would change. Vygotsky (1962) stated that private speech utterances become predicated, syntactically and psychologically, as they serve a self-regulating function. Syntactic predication, as defined by Vygotsky (1962), is characterized by utterance abbreviation whereby only the syntactic predicate is verbally encoded. Psychological predication is also characterized by abbreviation; speakers encode into an utterance only that aspect of a situation which is immediately most relevant to the speaker at the time of utterance generation (Leont'ev, 1976-77; Wertsch, 1979). Wertsch (1979) hypothesized that children encode what is entering their consciousness at the time of utterance generation.

Wertsch (1979) has noted that the notion of psychological subject and predicate is similar to Chafe's (1979) new/old information distinction

which characterizes social discourse utterances. New information is that information being introduced by a speaker into listeners' consciousness for the first time. Old information is that information already shared by interlocutors. For example, in the utterance He's not at home the referent for the pronoun he is probably shared by interlocutors. The new information of this utterance is that the referent is not at home. In private speech only new information is verbally encoded.

A structural examination of individual private speech utterances then, should provide insight not only into the syntax of private speech but should provide insight also into those aspects of a situation speakers view as most relevant. This insight is based on the assumption that private speakers encode only those aspects of a situation which are most relevant. If one accepts this assumption, an examination of private speech generated in a controlled task situation should provide some insight into children's problem solving strategies in that situation. Various forms of analyses can be used to generalize about speakers' cognitive processes from the semantic structure of their utterances. Fillmore (1968) and Chafe (1970) noted that the case relations between nouns and verbs within utterances represent ways in which speakers order their environments.

Chafe has outlined the following verb concepts as part of his class of semantic structures: verbs of state, process verbs, and action verbs. The following nouns accompanied the above verbs to constitute possible case structures: agent, patient, experience, beneficiary, instrumental, complement nouns, and location.

It has been hypothesized by Levina (in press) that in a task situation children will attend to specific aspects of the task differentially, according to age. In this theory children initially label objects which

are perceivable in their environment. Such utterances should be characterized, in noun-verb relation terms, by state verbs and patient nouns. Lyons (1977) corroborates this; developmentally, when children verbally encode nouns denoting objects, they first encode immediately perceivable objects. Their encoding of nouns becomes more abstracted when they encode non-present objects. Levina (in press) states that older preschoolers' encode their actions on objects. Actions are typically analyzed by examining state, process, or action verbs. Halliday (1973) has suggested that a class of mental verbs, e.g., perceptions, reactions, cognitions, to supplement this class of verbs.

To summarize, it was hypothesized that the syntactic structure of preschoolers' private speech utterances would become abbreviated with age. Also, analyses of the semantic structure of preschoolers' private speech should provide insight into their cognitive processes. Levina hypothesized that these processes would be characterized by children first attending to objects (present then non-present) then actions.

The following were the specific hypotheses posed in this study.

1. Younger preschoolers would generate larger coefficients of egocentricism than older preschoolers.

2. The extent to which children regulate their actions with private speech, i.e., utterances accompanying and preceeding actions and semantic self-regulation, will develop during the preschool period.

3. Children's private speech will become syntactically abbreviated with age.

4. Developmentally, children will encode words denoting present objects before absent objects.

5. Developmentally, children will encode words denoting objects (present and non-present) before words denoting actions.

Method

Subjects

The forty-one children involved in this study all attended a university preschool and were mostly from middle and upper-middle class families. The sample consisted of all children in the center within the appropriate age range. The twenty-six females and fifteen males ranged in age from thirty-eight to sixty-nine months. Each child was assigned to one of three age groupings: Age I (3,3 - 3,11) was composed of 4 males and 6 females ($\bar{x}$ age = 42.1 months, SD = 3.56); Age II (4,0 - 4,11) had 6 males and 10 females ($\bar{x}$ age = 53.1 months, SD = 3.77); Age III (5,0 - 5,9) had 5 males and 9 females ($\bar{x}$ age = 63.3 months, SD = 3.15).

Materials

The materials consisted of twelve jig-saw puzzles, four for each age group. Two puzzles for Age I had eight pieces and two had seven pieces. Puzzles for Age II had fourteen pieces. Puzzles for Age III had 22 pieces. Each child was given two puzzles, randomly selected from the four age-appropriate puzzles for his/her group. One experimenter and two children sat at two separate tables in the same experimental play room of the child care center. The puzzle sessions were videotaped by another experimenter.

Procedure

The author and a female graduate student spent the week prior to the start of the data collection sessions in the three classrooms from which the sample was drawn. By the end of the week children and experimenters seemed comfortable with each other. During their regular free play time, two children from each age group were taken to an experimental play room by the female graduate student. The playroom was furnished with two large

tables. The children were seated at opposite ends of one table and were each given two randomly selected puzzles. The experimenter told the children: I'd like you both to do these puzzles. I'll be writing at this table, so try to do them by yourselves. The experimenter, sitting at an adjacent table, remained minimally responsive throughout the session, transcribing children's utterances. The other experimenter was in the adjoining videotaping booth. Puzzle sessions lasted fifteen minutes.

Data coding scheme

Data were gathered from two sources: transcripts written by the experimenter sitting in the playroom and videotapes of the play sessions. At the end of each day both experimenters viewed the videotapes and transcribed children's utterances and actions. The experimenter's transcripts were used when utterances from videotapes were incomprehensible. Utterances were coded as follows:

1. Motoric: Utterances preceded, accompanied, or followed actions.

2. Semantic self-regulation: Commands, e.g., Do this; plans, e.g., Now this; and questions, future tense verbs.

3. Case structure (Chafe, 1979): Each utterance with both a noun and a verb was coded as: agentive, patient, beneficiary, or locative.

4. Syntactic structure: The syntactic structure of each utterance was coded as being comprised of: noun or verb alone; both noun and verb; noun, verb and predicate noun; or verb and predicate noun.

5. Noun phrases (Lyons, 1977): Where nouns existed in utterances they were coded perceptually present or absent.

6. Verb phrases (Lyons, 1977; Halliday, 1973): Where verbs existed they were coded as state (a static state of affairs), process (a dynamic situation extended in time), action (agent controlled), or mental verbs (perceptions, reactions, cognitions).

7. Descriptive: Utterances were descriptive if they: described part or all of a puzzle, a puzzle frame, or an action.

8. Task irrelevant: Utterances were seen as irrelevant if they were: social, i.e., eye contact with interlocutor, or private speech play, i.e., word play, sound play, singing, or incomprehensible.

The author coded all utterances according to the above outlined coding scheme. All utterances were coded on the motoric and syntactic criteria. The extent to which utterances were coded on other variables varied according to their content and function. Utterances could be either semantic self-guiding or descriptive. Noun-verb structure was coded only if the utterance contained, both a noun and a verb. Nouns and verbs were coded separately each time they were observed.

Reliability

After the author coded all utterances, 300 utterances were randomly chosen to be recoded by a second coder. Inter-rater agreement for each category were as follows:

Motoric: 91%
Semantic self-regulation: 89%
Case: 58%
Syntax: 97%
Noun Phrases: 76%
Verb Phrases: 78%
Descriptive: 94%
Social/task irrelevant: 6?%

Results

A series of ANOVAs were computed to examine the extent to which age and puzzle order effected children's performance on each of the following categories of private speech: motoric, semantic self-regulation, syntax, care relations, verb phrase, noun phrase, and descriptive. A series of age x puzzle x individual private speech category ANOVA's indicated neither

significant main effects for puzzle order nor significant interactions between puzzle order and age on any of the individual categories. Thus, data for each child were pooled across puzzles for subsequent analyses.

Coefficients of egocentricism, i.e., a ratio of all private speech utterances to total speech (all private and all social speech utterances) for each age group were calculated to determine the extent that coefficients varied with age and sex. The mean coefficients for each age group are as follows: Age I: .58 (SD = .32); Age II: .57 (SD = .19); Age III: .37 (SD = .27) A one-way ANOVA was computed to determine the effect of age on the coefficients. The analysis revealed a significant main effect for age, F (2,37) = 3.528, $p < .03$. Newman-Keuls analyses indicated that the means for both Ages I and II were significantly higher than the mean for Age III, $p < .01$; there was no significant difference between Ages I and II. T-tests between mean ratios for boys and girls in each age group were not significant.

The remaining analyses examined the distribution of each private speech category across age and sex. The means and standard deviations for each category within each age group are presented in Table 1.

(Table 1 here)

The objective of the next series of analyses was to determine the extent to which private speech regulated behavior. Motoric aspects of private speech, semantic self-regulation, and the combination of these two categories were each examined separately.

An age (3) x sex (2) x motoric (3) utterance preceding, accompanying, or following action ANOVA was computed. Types of motoric utterances were found to be significantly different from each other, F (12,66) = 36.541, $p < .001$. A series of Newman-Keuls tests indicated that the class of

utterances accompanying actions ($\bar{x}$ = 17.13) was significantly greater ($p < .05$) than the class of utterances following actions ($\bar{x}$ = 7.85) which, in-turn, was greater than utterances preceding actions ($\bar{x}$ = 4.00). A signficant but disordinal, motoric X age interaction was observed, F (4, 66) = 2.70, $p < .04$.

To further examine the motoric x age interaction the simple effects (Winer, 1962) of both age and motoric utterances were analyzed. Simple effect analyses were used because the interaction was disordinal. Analyses suggested that the simple effect of age was significant at Age I, F (2,66) = 22.89, $p < .01$, at Age II, F (2,66) = 16.64, $p < .01$, and at Age III, F (2,66) = 3.36, $p < .05$. A series of Newman-Keuls tests were performed for the simple effect of age on motoric utterances at each age level. Age I children generated signficantly more ($p < .01$) utterances accompanying actions ($\bar{x}$ = 23.64) than utterances following actions ($\bar{x}$ = 13.27) and preceding actions ($\bar{x}$ = 3.64). This group also spoke more often while acting than after acting ($p < .01$). For Age II, utterances accompanying actions ($\bar{x}$ = 17.53) were significantly greater ($p < .05$) than utterances following actions ($\bar{x}$ = 6.00) and preceding actions ($\bar{x}$ = 4.00); there was not a significant difference between utterances preceding and following actions for Age II. Children in Age III generated significantly more ($p < .05$) utterances accompaning actions ($\bar{x}$ = 11.5) than utterances following ($\bar{x}$ = 5.38) and preceding actions ($\bar{x}$ = 4.31); there was no significance between utterances preceding or following actions for this group.

Simple effects for motoric utterances were significant for utterances accompanying actions, F (2,66) = 10.38, $p < .01$, and for utterances following actions, F (2,66) = 5.12, $p < .01$. A series of Newman-Keuls analyses were

computed for each significant simple effect. Age I generated significantly ($p < .01$) more utterances accompanying actions ($\bar{x} = 23.64$) than both Age II ($\bar{x} = 17.53$) and Age III ($\bar{x} = 11.15$). Age II generated significantly more utterances accompanying actions than Age III ($p < .05$). Utterances following actions for Age I ($\bar{x} = 13.27$) children were significantly greater ($p < .05$) than those for Age II ($\bar{x} = 6.00$) and for Age III ($\bar{x} = 5.38$); there was no significant difference between Ages II and III for utterances following actions. Sex did not have a significant main effect or interact significantly with the general category of motoric utterances.

To summarize the motoric analyses, all children, despite age, spoke most often while acting. Age I spoke more during and after acting than either of the other groups. Age II spoke more while acting than did Age III. There was no significant effect for sex.

An age (3) x sex (2) x semantic self-regulation (3-command, question, plan) ANOVA found that types of semantic self-regulation differed significantly from each other, F (12,66) = 9.05, $p < .0001$. A significant, but disordinal, interaction between semantic self-regulation and age was also found, F (4,66) = 6.06, $p < .001$.

In an effort to further explore the relations between semantic self-regulation and age, the simple effects of both age and semantic self-regulation were computed. The simple effect analyses showed that age had a significant effect only at Age I, F (2,66) = 16.89, $p < .01$. Newman-Keul analysis on this effect showed Age I children ($\bar{x} = 7.36$) asked significantly more ($p < .01$) questions than either Ages II ($\bar{x} = 2.13$) or III children ($\bar{x} = 2.23$); there was no difference between Ages II and III. Questions-to-self for children in Age I, however, were highly correlated

with expressions of difficulty, e.g., How do I do this, r (11) = .66, $p < .02$. There was no significant effect for sex on semantic self-regulation.

The next analysis was carried out on all self-regulating utterances together, i.e., utterances preceding and accompanying actions plus all semantic self-regulating utterances. A one-way ANOVA measuring the effect of age and sex on total self-regulating utterances detected no significant main effects, F (5,33) = .86, $p < .5$.

An age (3) x sex (2) x goal (2-goal encoded; goal evaluated) ANOVA revealed a significant difference between articulation and evaluation of goals, F (6.33) = 5.853, $p < .02$. A Newman-Keuls analysis on this effect showed that children articulated goals ($\bar{x}$ = 9.154) significantly more ($p < .05$) than they evaluated goals ($\bar{x}$ = 6.897). Neither sex nor age, interacted significantly with goals.

To discover whether children described puzzle pieces, the location for pieces, or actions upon puzzles, and how this varied according to sex and age, an age (3) x sex (2) x description (3-piece name, location, action) ANOVA was computed. A significant difference among the categories comprising the descriptive category was observed, F (12,66) = 11.055, $p < .0001$. Newman-Keuls analysis showed that there was a significant difference ($p < .01$) between children's describing puzzle pieces ($\bar{x}$ = 8.56) and both actions ($\bar{x}$ = 2.51) and locations ($\bar{x}$ = .974). Age and sex did not interact significantly with the description category.

The next series of analyses attempted to describe the effect of age and sex on the linguistic structure, i.e., syntactic and semantic structure, of preschoolers' private speech utterances. An age (3) x sex (2) x

syntactic structure (4-noun or verb alone; noun and verb; noun, verb, and predicate noun; verb and predicate noun) ANOVA detected a significant difference between the different syntactic structures, $F(18,99) = 22.564$, $p < .0001$. A follow-up Newman-Keuls analysis showed that the structure comprised of a noun, verb, and predicate noun ($\bar{x} = 10.18$) was significantly greater ($p < .01$) than the verb and predicate noun structure ($\bar{x} = 1.28$), the noun and verb structure ($\bar{x} = 1.85$), and significantly greater ($p < .05$) than the noun or verb alone structure ($\bar{x} = 7.31$). The noun or verb alone structure was significantly greater than the verb and predicate noun structure ($p < .05$) and the noun and verb structure ($p < .01$). There were no significant interaction effects for age or sex on syntactic categories. The case structure of the utterances containing both a noun and a verb were examined in an age (3) x sex (2) x case (4-agent, patient, beneficiary, locative) ANOVA. Other noun-verb cases articulated by Chafe were not analyzed because they were not observed in the study. A significant difference between individual case categories was found $F(18,99) = 17.777$, $p < .0001$. Newman-Keuls analyses suggested that the patient case ($\bar{x} = 3.77$) was significantly greater ($p < .01$) than the beneficiary ($\bar{x} = .282$) and agentive ($\bar{x} = .667$) cases. The locative case ($\bar{x} = 3.67$) was significantly greater than the beneficiary and agentive cases ($p < .01$). There were no significant interaction effects for age or sex on case.

Further analyses of the semantic structure of private speech utterances were carried out by examining the individual verb and noun separately. An age (3) x sex (2) x verb categories (4-state, process, mental, agent controlled action) ANOVA revealed a significant difference between the individual verb categories, $F(18,96) = 4.089$, $p < .009$. A significant but

disordinal, age x verb interaction was also observed, F (6,96) = 3.384, $p < .005$. Simple effects analyses for age and verb categories revealed that the simple effect of age on verb categories was significant only for Age I, F (3,96) = 10.93, $p < .01$. Newman-Keuls analyses on this simple effect showed that, for Age I, state verbs ($\bar{x}$ = 10.82) were significantly greater ($p < .01$) than process ($\bar{x}$ = 4.09), mental ($\bar{x}$ = 3.00) and agent controlled verbs ($\bar{x}$ = 1.63).

Next, the simple effect for verbs on age was calculated and a significant effect was found only for state verbs, F (2,96) = 13.62, $p < .01$. Newman-Keuls analyses showed that Age I ($\bar{x}$ = 10.82) generated significantly more ($p < .01$) state verbs than both Ages II ($\bar{x}$ = 4.50) and III ($\bar{x}$ = 2.69). No differences between Ages II and III were observed. No interaction effects for sex on verbs were found.

The extent to which types of noun phrases were distributed across age and sex was the last aspect of semantic structure examined. An age (3) x sex (2) x noun phrase (2-present; non-present) revealed types of noun phrases differed significantly from each other, F (2,33) = 24.271, $p < .0001$. Follow-up Newman-Keuls showed that significantly more perceptually present than non-present objects were encoded ($p < .01$). There were no significant interactions between age and sex and noun phrases.

Discussion

The general intent of this study was to examine the development of three aspects of preschoolers' private speech: the interpsychological to intrapsychological progression; the extent to which it regulates behavior; and the linguistic structure of individual utterances. The results of the study suggest that three year olds generate proportionally more private speech than older preschoolers. Second, preschoolers', despite age, talk to themselves while they are acting. Third, neither the syntactic nor semantic structures of utterances vary with age.

The first hypothesis stated that younger preschoolers would generate proportionally more private speech than older preschoolers. Analyses supported this hypothesis: three year olds' coefficients of egocentricism where larger than the coefficients for both four and five year olds; there was no significant difference between fours and fives. These data fit Vygotsky's (1962) hypothesis which stated that private speech originated in the social dialogues between an adult and a child (on an interpsychological plane). With development children were thought to internalize these dialogue strategies, first overtly then covertly (private speech on an intrapsychological plane).

Rubin (1979) examined this same phenomenon with older children, in grades 1, 3, and 5, and found no significant effect for grade. The reason for this finding may be that by grade 1 children are already using private speech intrapsychologically. Data from the present study indicate that after three years of age the proportion of private to total speech does not vary significantly.

The second hypothesis examined the development of preschoolers'

ability to regulate their behavior with private speech. It was hypothesized that the ability to regulate behavior would develop during the preschool period. Self-regulating private speech was defined on a motoric level, i.e., utterances accompanying then-preceding actions, and on a semantic level, i.e., utterances indicating a planning or an analytic function. The Vygotsky model of development stated that children would use private speech initially following actions then accompanying actions and, finally, preceding actions. Children's ability to use semantically self-regulating utterances, was also hypothesized to develop.

Data from the present study indicated that preschoolers , despite age, generate private speech accompanying actions. These data are similar to Rubin's (1979) findings on preschoolers' self-regulating private speech. Data from both of these studies indicated that children across the preschool period use the lowest form of self-regulation, speech accompanying action.

Analyses of preschoolers' semantic self-regulation did not follow the developmental trend outlined by Vygotsky (1962, 1978) and Luria (1961). That is, older preschoolers did not seem to use private speech to analyize situations and plan future actions. The only semantic self-regulation category found to differ significantly across the preschool period was questions-to-self. The age effects, however, were not in the hypothesized direction: Three year olds posed significantly more questions-to-self than both of the older age groups. The extent to which all children used other forms of semantic self-regulation,i.e., plans and commands, did not vary significantly with age.

The content of the three year olds' questions-to-self suggest that they posed questions when they were experiencing difficulty, e.g., How's this go? Where's the head? There was a high positive correlation between three year olds' questions and expressions of difficulty. The frequency and content of this group's questions may have been due to the quazi-social (non-responding auditors present) nature of the experimental context: a non-responding experimenter and two children were in each session. The three year olds may have posed overt questions-to-self when they experienced difficulty merely because of the presence of external auditors; despite the auditors non-responsive roles.

As was previously stated, private speech may develop from an inter-psychological to an intrapsychological plane. This developmental trend suggests that the three year olds may have reverted to an inter-psycholgical strategy when they encountered difficulty. These questions were not posed directly to an external auditor. The presence of the auditors alone may have encouraged the youngest group to pose the questions overtly. Older children may have been more able to assess the non-responsive role of the auditors and thereby not posed overt questions-to-self. Other research (Fuson, 1979; Pellegrini, in press) has shown that the quantity and quality of private speech is effected by the social nature of the experimental context.

The data from this study on self-regulating private speech do not support Vygotsky's and Luria's developmental hypotheses. Children, despite age, talk while they act. Secondly, only the youngest group of children posed a significant amount of semantically self-regulating private speech. When all types of self-regulation, i.e. utterance preceding and accompanying actions plus all semantic self-regulation, are

combined into one general category and examined across the preschool period. No significant effects for age are detected.

Private speech accompanying actions, though it does not seem to vary with age, does serve a self-regulating function. Wertsch (in press) has stated that young children's private speech accompanying actions serves a mediating role between actions and the objects being acted upon. This form of private speech is used to verbally encode aspects of a situation which the speaker views as most relevant to the solution of the problem at hand. It has been argued (Sigel, 1979; Levina, in press) that verbally encoding perceptually present objects and actions is a necessary precursor to the child being able to mentally represent those aspects of a situation; that is, verbally encoding perceptually present aspects of a task help the child accumulate mental images of effective ways in which objects were used to solve problems. This collection of mental images should eventually enable children to use problem solving strategies which are not based on perceptually present objects. It is argued that private speech accompanying actions helps children build such of repertoire of problem solving strategies. Verbal encoding of actions and objects helps children remember the most effective strategies.

An examination of the semantic structure of the private speech utterances adds support to the notion that these children, despite their age, are using private speech to encode objects present in their environment. Analyses of individual noun phrases showed that all children, despite age, encoded more perceptually present objects than perceptually absent objects. Analyses of case relations also showed that children were describing objects; they most frequently encoded

the patient case. The patient case is typically discriptive of a state, e.g., It's big, or a process, e.g., It's finished. The next most frequently encode case was the locative case. Locative nouns, accompanied by either state, process, or action verbs, described locations for individual puzzle pieces, e.g., Goes here.

The semantic structure data present a clear picture of children's use of private speech accompanying actions. Children's private speech typically encoded physically present objects, i.e., individual puzzle piece, or the locations for these pieces. There findings replicate Pellegrini's (1980) finding with a smaller and less diverse age group of preschoolers.

When preschoolers sit down to a puzzle task they typically encode objects and locations, not actions, because, following Wertsch's (1979) analysis of activity, the actions are not the most relevant aspect of the problem; they already know how to place a puzzle piece into a frame. The most relevant information for preschoolers involves the identification of individual puzzle pieces and their locations. In that children usually encoded puzzle pieces and their locations we can say that objects and locations represent the new or most relevant, information for speakers at the time of utterance generation. Irrelevant aspects of the task, such as actions, were not verbally encoded. This is what Vygotsky (1962) and Leont'ev (1976-77) meant when they said private speech was psychologically predicated; only the most relevant information is encoded.

Vygotsky (1962) and Leont'ev (1976-77) also hypothesized that children's private speech would become syntactically abbreviated during the preschool period. Syntactic abbreviation was thought to develop because of speakers' propersity to encode, with development, only

relevant aspects of a situation; irrelevant information was not encoded. Thus, the syntactic abbreviation data from the present study do not support such a developmental trend. There was not a significant age effect on syntax. The structure consisting of a noun phrase, a verb phrase, and a predicate noun (N + V + N) was observed significantly more than any other syntactic structure, despite age. The N + V + N structure was the most complex, not the simplest, structure observed. However, the simplest structure, i.e., a noun phrase or a verb phrase alone, was the second most frequently observed structure. The syntactic data, then, present somewhat of a paradoxical picture: the most and least complex syntactic structures characterized preschoolers private speech.

The relatively high frequency of the most abbreviated structure suggests that some support exists for the abbreviation hypothesis, though abbreviation does not seem to vary according to preschoolers' age. The complex syntax is characteristic of the syntax of social discourse. The generation of high frequencies of complex syntax may be due to the quasi-social experimental context. That is, children's syntax approximated the syntax of social discourse because they were in the presence of other people. The syntax of preschoolers' doing puzzles alone should be examined to clarify this problem.

To summarize, preschoolers' private speech tends to serve the same function across the preschool period. Children encoded perceptually present objects and locations while they were acting. The only significant developmental trend observed related to the interpsychological-intrapsychological progression.

References

Austin, J.L. Performative-Constative. In J.R. Searle (Ed.) The philosophy of language. London: Oxford, 1971.

Chafe, W.L. Meaning and the structure of language. Chicago: University of Chicago Press, 1970.

Fillmore, C.J. The case for case. In E. Bach and R.T. Harms (Eds.), Universals in linguistic theory. New York: Holt, Rinehart, and Winston, 1968.

Fuson, K.C. The development of self-regulating aspects of speech: A review. In G. Ziven (Ed.) The development of self-regulation through private speech. New York: Wiley, 1979, 135-218.

Halliday, M. The functional basis of language. In B. Bernstein (Ed.) Class, Codes, control, volume 2. London: Routledge & Kegan Paul, 1970.

Leont'ev, A. Some new trends in Soviet psycholinguistics, Soviet psychology, 15, 1976-77, 15-25.

Levina, R. Vygotsky's ideas about the planning function of speech in children. Soviet psychology, in press.

Luria, A.R. The role of speech in the regulation of normal and abnormal behavior. New York: Liverright, 1961.

Lyons, J. Semantics, vols., I-II. New York: Cambridge University Press, 1977.

Pellegrini, A.D. Semantic analysis of preschoolers' private speech. Communication and cognition, 1980.

Pellegrini, A.D. The social orientation of private speech. Child Study Journal, in press.

Pellegrini, A.D. & DeStefano, J. Functions of private speech in preschoolers. International Journal of Psycholinguistics, 15, 1980, 27-42.

Piaget, J. The language and thought of the child. London: Routledge and Kegan Paul. 1926.

Rubin, K. The impact of the natural setting on private speech. In G. Zivin (Ed.) The development of self-regulation through private speech. New York: Wiley, 1979, 265-294.

Sigel, I. On becoming a thinker: A psycho-educational model. Educational psychologist, 14, 1979, 70-78.

References, Cont.

Wertsch, J. The regulation of human action and the given-new organization of private speech. In G. Zivin (Ed.) The development of self-regulation through private speech. New York: Wiley, 1979, 79-98.

Wertsch, J. Introduction to the concept of activity in Soviet psychology, Soviet psychology, in press.

Winer, B. Statistical principles in experimental design. New York: McGraw-Hill, 1962.

Vygotsky, L.S. Thought and language. Cambridge: MIT, 1962.

Vygotsky, L.S. Mind in society. Cambridge: Harvard, 1978.

Table 1

Means and Standard Deviations for Each Private Speech Category by Age Group

	Age Group					
	1		2		3	
Category*	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
M_1	3.636	6.637	4.000	3.207	4.307	4.423
M_2	23.636	18.456	17.533	13.835	11.153	8.394
M_3	13.272	10.498	6.000	5.464	5.384	5.810
S_1	1.363	3.585	.800	1.082	1.692	2.015
S_2	7.363	7.915	2.133	2.445	2.230	3.767
S_3	.636	.924	2.200	3.189	3.307	3.010
C_1	1.272	1.902	.533	1.245	.307	.480
C_2	4.454	5.733	3.733	4.165	3.230	4.693
C_3	.090	.301	.333	.723	.384	.869
C_4	6.000	5.585	2.866	3.159	2.615	4.154
D_1	12.909	12.895	8.800	15.479	4.615	5.723
D_2	4.000	4.857	1.933	2.763	1.923	2.289
D_3	1.363	1.501	.866	1.060	.769	1.012
T_1	13.545	0.152	17.000	13.180	6.615	4.752
T_2	14.909	.088	23.200	20.633	47.615	40.731
V_1	10.818	0.609	4.266	5.522	2.692	3.945
V_2	4.090	4.323	1.866	2.030	3.923	5.267
V_3	3.000	5.567	2.500	3.107	3.230	3.443
V_4	1.636	2.292	2.933	2.840	3.923	3.796
N_1	12.545	11.084	5.866	5.316	9.692	9.419
N_2	1.909	2.879	3.133	2.875	4.384	5.124
SX_1	12.636	15.895	4.733	3.081	5.769	5.479
SX_2	1.454	1.694	1.133	1.187	3.000	3.851
SX_3	14.545	15.292	8.800	6.919	8.076	7.675
SX_4	1.181	1.721	1.600	1.594	1.000	1.471

*M_1 = utterances preceding action; M_2 = utterances accompanying actions; M_3 = utterances following actions. S_1 = command; S_2 = question; S_3 = plan.

C_1 = agentive case; C_2 = patient case; C_3 = beneficiary case; C_4 = locative case. D_1 = description of part or whole of puzzle; D_2 = description of action; D_3 = description of location. T_1 = word or sound play; T_2 = social speech. V_1 = state verb; V_2 = process verb; V_3 = mental verb; V_4 = activity verb. N_1 = event; N_2 = proposition. SX_1 = noun or verb phrase only; SX_2 = noun and verb phrases; SX_3 = noun and verb and predicate noun; SX_4 = verb and predicate noun.